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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/069,517	03/05/2002	Claude Jaussaud	220040US2PCT	9383
22850	7590	09/16/2005		
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER GUERRERO, MARIA F	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 09/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/069,517

Applicant(s)

JAUSSAUD ET AL. 

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 23-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 23-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. This Office Action is in response to the Amendment and the Request for continued examination filed August 23, 2005.

### **Status of Claims**

2. Claims 1-22 are canceled. Claims 23-31 are pending.

### ***Continued Examination Under 37 CFR 1.114***

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 23, 2005 has been entered.

### ***Priority***

4. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Objections***

5. Claim 31 is objected to because of the following informalities: claim 31 recites: forming at least one oxide layer onto at least one of the deposited conductive layers; no insulator layer being interposed between the two faces; the oxide of the at least one

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oxide layer is chosen to react with at least one material of the conductive layers to form isolated precipitates. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 23-24 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Malhi (US 5,349,207).

7. Malhi teaches a method of creating an electrically conducting bonding between a face of a first semiconductor element and face of a second semiconductor element by heat treatment (Abstract). Malhi discloses depositing at least one layer of material (a semiconductor material or an electrical conductor material) on the face of the first semiconductor element and at least one layer of material on the face of the second semiconductor element; wherein one of the layers is deposited with an excess thickness (Fig. 5a-5d, col. 3, lines 30-66, col. 3, lines 40-55, col. 4, lines 10-35).

8. In addition, Malhi teaches applying the faces one against the other with interposing of the deposited layers and carrying out a heat treatment the layers to form a layer that provides electrically conducting bonding between the two faces (Fig. 5b-5d, col. 3, lines 40-55, col. 4, lines 1-35). Malhi shows no insulator layer being interposed between the two faces such that the semiconductor film is not electrically insulated from the first semiconductor element (Fig. 5a-5d).

9. Furthermore, Malhi teaches reacting the layers of material in a solid phase during heat treatment to form a temperature stable mixture with respect to the first and second semiconductor elements (col. 4, lines 1-35). Malhi discloses not inducing any reaction product between the deposited layer of material and at least one of the semiconductor elements during the heat treatment (Fig. 5a-5d, col. 4, lines 1-35).

10. Claims 23-24 and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Merchant et al. (U.S. 6,118,181).

11. Merchant et al. teaches a method of creating an electrically conducting bonding between a face of a first semiconductor element and face of a second semiconductor element by heat treatment (Abstract). Merchant et al. discloses depositing at least one layer of material (a semiconductor material or an electrical conductor material) on the face of the first semiconductor element and at least one layer of material on the face of the second semiconductor element; wherein one of the layers is deposited with an excess thickness (Fig. 1A, col. 3, lines 30-66).

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12. Furthermore, Merchant et al. teaches applying the faces one against the other (pressing) with interposing of the deposited layers and carrying out a heat treatment the layers to form a layer that provides electrically conducting bonding between the two faces (Fig. 1B, col. 3, lines 45-66, col. 4, lines 1-30). Merchant et al. shows no insulator layer being interposed between the two faces such that the semiconductor film is not electrically insulated from the first semiconductor element (Fig. 1B).

13. In addition, Merchant et al. teaches reacting the layers of material in a solid phase during heat treatment to form a temperature stable mixture with respect to the first and second semiconductor elements (col. 3, lines 45-66, col. 4, lines 1-30).

Merchant et al. discloses not inducing any reaction product between the deposited layer of material and at least one of the semiconductor elements during the heat treatment (Fig. 1A-1B, col. 4, lines 1-30).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 25 and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Merchant et al. (U.S. 6,118,181) in view of Goesele et al. (U.S. 5,877,070) and Linn et al. (US 5,387,555).

15. Merchant et al. teaches a method of creating an electrically conducting bonding between a face of a first semiconductor element and face of a second semiconductor

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element by heat treatment (Abstract). Merchant et al. discloses depositing at least one layer of material (a semiconductor material or an electrical conductor material) on the face of the first semiconductor element and at least one layer of material on the face of the second semiconductor element; wherein one of the layers is deposited with an excess thickness (Fig. 1A, col. 3, lines 30-66).

16. Furthermore, Merchant et al. teaches applying the faces one against the other (pressing) with interposing of the deposited layers and carrying out a heat treatment the layers to form a layer that provides electrically conducting bonding between the two faces (Fig. 1B, col. 3, lines 45-66, col. 4, lines 1-30, col. 5, lines 25-30). Merchant et al. shows no insulator layer being interposed between the two faces such that the semiconductor film is not electrically insulated from the first semiconductor element (Fig. 1B).

17. In addition, Merchant et al. teaches reacting the layers of material in a solid phase during heat treatment to form a temperature stable mixture with respect to the first and second semiconductor elements (col. 3, lines 45-66, col. 4, lines 1-30). Merchant et al. discloses not inducing any reaction product between the deposited layer of material and at least one of the semiconductor elements during the heat treatment (Fig. 1A-1B, col. 4, lines 1-30). Merchant et al. also shows using titanium or other suitable elements as one of the layers deposited on the surface to be bonded (col. 3, lines 50-60).

18. Merchant et al. is silent about depositing tungsten to form the mixture comprising  $\text{WSi}_2$ . Merchant et al. does not specifically show the oxide being in a form of isolated

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precipitates. However, Linn et al. teaches the interposed layers comprising a layer of tungsten and a layer of silicon that could be on one of or both faces (col. 8, lines 20-25). Linn et al. teaches forming  $WSi_2$  during the heat treatment (Fig. 5b, col. 7, lines 3-15). Linn et al. teaches forming at least one oxide layer onto at least one of the deposited conductive layers and the oxide reacts such that the oxide formed is in a form of isolated precipitates that do not substantially harm the electrically conducting bonding (Fig. 5a-5b, col. 6, lines 58-67, col. 7, lines 1-28).

19. Merchant et al. is silent about the semiconductor element being SiC. However, Goesele et al. shows the use of SiC in the bonding process as conventional in the art (col. 3, lines 50-60, col. 6, lines 15-16).

20. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Merchant et al. reference by including the use of SiC as taught Goesele et al. and the use of tungsten and the oxide layer as taught by Linn et al. because Merchant et al. suggested that other suitable elements may be used and would provide better stress compensation and less contamination (Linn et al., col. 2, lines 60-68).

21. Claims 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Merchant et al. (U.S. 6,118,181) in view of Doyle et al. (U.S. 6,423,614).

22. Merchant et al. does not specifically show the step of preliminary defining the semiconductor film as a layer configured to be detached. Merchant et al. does not specifically show step of forming microcavities by ionic implantation through the face of



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the semiconductor element. However, Doyle teaches defining the semiconductor film as a layer configured to be detached and forming the thin film on the substrate by forming microcavities using ionic implantation (Fig. 3-12, col. 3, lines 3-65, col. 6, lines 5-45).

23. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Merchant et al. reference by including the steps of forming the thin film on the substrate by forming microcavities using ionic implantation as taught by Doyle in order to obtain an integrated circuit with a second level of transistors with competitive performance at lower cost (Doyle, col. 2, lines 5-10).

### ***Response to Arguments***

24. Applicant's arguments with respect to claims 23-31 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***


25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ohmi et al. (US 6,255,731), Ohshima et al. (US 6,251,754) and Muto et al. (US 4,826,787) teach several embodiments related to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 2, 2005

  
**MARIA F. GUERRERO**  
**PRIMARY EXAMINER**